Assessment of Body Mass Index of Tuberculosis Patients on Anti-Tuberculosis Drugs in Ibadan, Oyo State, Nigeria

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ABSTRACT

This study assessed Body Mass Index (BMI) of tuberculosis patients on anti-tuberculosis drugs in Ibadan, Oyo State, Nigeria. Cross-sectional study was conducted on 30 tuberculosis patients from Tuberculosis Clinic, Molete, Ibadan, Oyo State, Nigeria. The demographic information was analyzed using descriptive statistics while BMI was (BMI) was used to determine the anthropometry values of the respondents. Inferential statistics was used to elucidate the relationship between demographic factors and BMI. Results showed that mean age of respondents was 38 years, while 53.3% of the respondents were males. In respect to education, most (46.7%) of the respondents had tertiary education and almost half (46.7%) of the respondents engaged in private businesses. Most (33.3%) of the respondents weighed between 66–72kg and about 33.3% of the respondents were within the height ranged from 1.53 – 1.60m and 1.66 – 1.70m respectively. Outcome of BMI revealed that over 70% of the respondents fell within the normal weight group (18.5 – 24.9 kg/m^2) while 26.7% were underweight (less than 18.5 kg/m^2). Results further showed that there was a significant relationship (p<0.05) between demographic factors (gender 0.048, age 0.038, ethnicity 0.000, religion 0.035, household size 0.004, education, 0.006 and occupation 0.036) and BMI among tuberculosis patients in the study area; also there was a significant relationship (p<0.05) between BMI and anti-tuberculosis drugs. Conclusively, findings revealed that occurrence of tuberculosis was more among the males compared to the females. However, majority of the respondents had normal weight based on the BMI outcome.

Keywords: Tuberculosis patients, Anti-tuberculosis drugs, Body Mass Index.

INTRODUCTION

Tuberculosis (TB) is a long-lasting communicable disease that affect any unit of the body nevertheless more regularly the lungs [1]. Globally, tuberculosis (TB) still remains a collective and lethal disease which causes great mortality specifically in low and middle income countries where there is high occurrence [2]. Tuberculosis is a communicable disease instigated by mycobacterium TB species which is diffused via air which could attack anybody irrespective of gender or age, and any body part usually lungs; likewise, spine, brain and kidney. Symptoms of sufferers of tuberculosis include chest pain, loss of appetite, coughing, fever, fatigue, cold and shortness of breath [3].

Tuberculosis still remains a subject of public health as well as international challenge in the world [4]. Report form World Health Organization (WHO), [5] revealed that about 10 million people were attacked by tuberculosis while mortality of

1.3 million people was recorded yearly. Furthermore, it was revealed that based on estimate, 95 percent of sufferers of tuberculosis are mostly in developing countries, while 75 percent of sufferers of tuberculosis are in their productive age groups between 15-50 years [4]. According to the Centers for Disease Control and Prevention (CDC) and World Health Organization body, 10 million occurrence of tuberculosis cases were estimated, and around 1.5 million of mortalities occurred which is approximately 23% of the global population.

In 2019, representative of World Health Organization stated that Nigeria had made a commitment to diagnose and treat more than 1.1 million cases of tuberculosis as well as place around 2.2 million patients on tuberculosis preventive therapy from 2018 to 2022. In 2020, 9.9 million people were estimated to develop tuberculosis where Nigeria had the highest number of cases of TB which account for 4.6% of the international burden of TB [6]. The WHO body reported that active cases of TB finding is important in lessening the TB burden in the country since Nigeria has more than 440,000 occurrence cases of TB, and above 300,000 are assessed to be missed yearly. According to WHO, TB cases keep increasing in Nigeria from 120,266 in year 2019 to 138,573 in year 2020. Nevertheless, on the countries list with the international burden of tuberculosis, Nigeria was ranked by the World Health Organization as the fourth (4th) behind India (1st), Indonesia (2nd), and China (3rd) as specified in the International Tuberculosis report in 2015 [7]. Report by Oyo State government in 2020 stated that about 8,101 people were confirmed positive for TB in the state.

Tuberculosis is a prolonged transmissible disease which has an impact on the nutritional status of the patient [8]. There is a bidirectional relationship between tuberculosis and malnutrition. According to [9], one-quarter of the tuberculosis globally was because of malnutrition; hence enhancing individual nutritional status decreases tuberculosis risk. Moreover, malnutrition increases mortality and relapse of tuberculosis [3]. On the other hand, high body mass index (BMI) such as overweight and obese have been revealed to be defensive against TB while low BMI is prone to TB development [5].

Earlier literatures have validated that increase in BMI reduces the prevalence of TB infection [10, 11]. Prior studies have also revealed the influence of BMI on TB-related mortality [12]. Across all the levels of BMI, it was discovered that BMI has inverse relationship with the danger of TB. Studies have established the relationship between lower BMI with a greater danger of death amongst TB patients [13; 14; 15]; on the other hand, another study discovered that there is no such relationship [16].

Even though a lot of literatures have assessed risk factors for mortality in Tuberculosis (TB) patients, confirmation concerning the link between body mass index (BMI) and mortality in TB patients is inadequate [14, 17, 15]. The link between BMI and usage of anti-tuberculosis drugs had been sparsely studied. Therefore, the treatment outcomes of tuberculosis patients can be enhanced by examining their nutritional status. Hence, this study assessed the association of Body Mass Index (BMI) of tuberculosis patients on anti-tuberculosis drugs in Ibadan, Oyo State, Nigeria.

METHODOLOGY
Study location, sampling procedure and data collection
The study was carried out in Ibadan, Oyo State, Nigeria. Ibadan is one of the indigenous cities in Sub-Sahara Africa, positioned at an elevation ranging from 152 m to 213 m with remote points and heights increasing to 274 m. It is the state capital of Oyo State which is nearby the forest savannah limit of south-west of Nigeria on latitude 7° north of the equator and longitude 3° east of the Greenwich meridian [18]. Ibadan encompasses mainly the Yoruba tribe and other ethnic groups. The city is dominated by civil service jobs with some private businesses, trade and peasant occupations and some industrial level of activity [18]. Tuberculosis clinic at Molete, Ibadan, Oyo State, Nigeria was used for this study. Purposive sampling was used to select patients using anti-tuberculosis drugs from the location. A total number of thirty (30) TB patients were recruited for this study and informed consent was obtained from the study participants. The study location was visited on all the clinic days and the respondents interviewed were mainly patients who were in their second (2) months of treatment and volunteered to participate were recruited at arrival for the study. A semi-structured questionnaire was self-administered to the respondents by trained research assistants for collection of data. Likewise, weighing scale and height meter was used for the anthropometric

measurement of the respondents. The weight and height of the respondents were measured and recorded. Likewise, the different types of anti-tuberculosis drugs used by the patients were noted.

Data analysis

For the demographic data, descriptive statistics was used for analysis while Body Mass Index (BMI) was used to determine the anthropometry values of respondents. Inferential statistics such as chi square was used to clarify the relationship between body mass index and tuberculosis.

Results

Table 1 presents the descriptive statistics of demographic factors of tuberculosis patients in Ibadan. Result showed that the average age of respondents was 38 years. About half (53.3%) of the tuberculosis patients were males while majority (90%) were of Yoruba ethnicity and a few (10%) were Igbos. Two-third (66.7%) of the respondents were Christians and the other one-third (33.3%) practiced Islam. Table 1 further revealed that half of the respondents had household size between 5 – 7 people. In respect to education, almost 50% of the respondents had tertiary education, 30% of them had secondary education while 23.3% of them had primary education. A higher proportion (46.7%) of the respondents had their private businesses, 20% of them were artisans and traders, 10% of them were civil servants while 3.3% of them engaged in other jobs.

Table 1: Descriptive statistics of demographic factors of tuberculosis patients

Characteristics	Frequency	Percentage (%)
Age group (years)		
21 – 30	8	26.7
31 - 40	11	36.7
41 - 50	7	23.3
51 – 60	3	10.0
61 - 70	1	3.3
Mean ± std.	38± 12.16	
Gender		
Male	16	53.3
Female	14	46.7
Ethnicity		
Igbo	3	10.0
Yoruba	27	90.0
Religion		
Islam	10	33.3
Christianity	20	66.7
Household size		
1 – 4	13	43.3
5 – 7	15	50.0
Above 7	2	6.7
Highest Educational Attained		
Tertiary	14	46.7
Secondary	9	30.0
Primary	7	23.3
Occupation		
Artisan	6	20.0
Civil servant	3	10.0
Private business	14	46.7
Trader	6	20.0
Other jobs	1	3.3
Total	**30**	**100.0**

Table 2: Characteristics of anthropometric measurement

Anthropometric measurements	Response	Frequency	Percentage (%)
Weight (kg)	41 – 50	5	16.7
	51 – 60	7	23.3
	61 – 70	16	53.3
	Above 70	2	6.7
Height (m)	1.53 - 1.60	10	33.3
	1.61 - 1.65	8	26.7
	1.66 - 1.70	10	33.3
	1.71 - 1.79	2	6.7
BMI (kg/m^2)			
Underweight	<18.5	8	26.7
Normal weight	18.5 – 24.9	22	73.3
Over weight	25.0 – 29.9	0	0.0
Obesity	30 and above	0	0.0
Total		**30**	**100.0**

Anthropometric measurement was presented in Table 2. About half (53.3%) of the respondents weighed between 61 – 70 kg, followed by 23.3% weighed between 51 – 60 kg while few (6.7%) weighed above 70 kg. Results further showed that 33.3% of the respondents fell within 1.53 – 1.60m and 1.66 – 1.70m respectively. The BMI results revealed that over 70% of the respondents were within the normal range (18.5 – 24.9 kg/m^2) while 26.7% were underweight (less than 18.5 kg/m^2).

2.1 Relationship between Demographic factors and BMI among tuberculosis patient
Result showed that there was a significant relationship ($p<0.05$) between demographic factors (gender 0.048, age 0.038, ethnicity 0.000, religion 0.035, household size 0.004, education, 0.006 and occupation 0.036) and BMI among tuberculosis patients in the study area.

2.1 Relationship between BMI and anti-tuberculosis drugs
Relationship between BMI and anti-tuberculosis drugs was shown in Table 5. It was discovered that there was a significant relationship ($p<0.05$) between BMI and anti-tuberculosis drugs.

Table 4: Relationship between Demographic factors and BMI among tuberculosis patient

BMI Tuberculosis patient (kg/m^2)			
	Underweight (Less than 18.5)	Normal weight (18.51-24.9)	
	Underweight (Less than 18.5)	Normal weight (18.51-24.9)	Total	P value
Gender				
Females	3(10.0)	11(36.7)	14(46.7)	0.048
Male	2(6.7)	14(46.7)	16(53.3)	
Age group (years)				
20 – 30	0(0.0)	8(26.7)	8(26.7)	
31 – 40	4(13.3)	7(23.4)	11(36.7)	
41 – 50	1(3.3)	6(20.0)	7(23.3)	0.038
Above 50	0(0.0)	4(13.3)	4(13.4)	
Ethnicity				
Igbo	1(3.3)	2(6.7)	3(10.0)	0.000
Yoruba	4(13.3)	23(76.7)	27(90.0)	
Religion				
Islam	2(6.7)	8(26.6)	10(33.3)	0.035
Christianity	3(10.0)	17(56.7)	20(66.7)	
Household size				
1 – 4	3(10.0)	10(33.3)	13(43.3)	
5 – 7	2(6.7)	13(43.3)	15(50.0)	0.004
Above 7	0(0.0)	2(6.7)	2(6.7)	
Education				
Tertiary	1(3.3)	13(43.4)	14(46.7)	
Secondary	3(10.0)	6(20.0)	9(30.0)	0.006
Primary	1(3.3)	6(20.0)	7(23.3)	
Occupation				
Artisan	3(10.0)	3(10.0)	6(20.0)	
Civil servant	0(0.0)	3(10.0)	3(10.0)	0.036
Private business	1(3.3)	13(43.4)	14(46.7)	
Trading	1(3.3)	5(16.7)	6(20.0)	
Others	0(0.0)	1(3.3)	1(3.3)	
Total	**5**	**25**	**30**	

Table 5: Relationship between BMI and anti-tuberculosis drugs

Anti-Tuberculosis Drugs	BMI of tuberculosis patient (kg/m^2)				Total	P value
	Underweight (Less than 18.50)	Normal weight (18.50 24.9)	Overweight (25.0- 29.9)	Obesity (30 and above)		
Isoniazid	2(6.7)	2(6.7)	0(0.0)	0(0.0)	4(13.3)	
Vitamin B6	2(6.7)	5(16.6)	0(0.0)	0(0.0)	7(23.3)	
Multivitamin	1(3.3)	6(19.9)	0(0.0)	0(0.0)	7(23.3)	0.034
Rifampin	0(0.0)	4(13.3)	0(0.0)	0(0.0)	4(13.3)	
All of the drugs listed above	0(0.0)	8(26.7)	6(20.0)	1(3.3)	8(26.7)	

DISCUSSION

Tuberculosis is one of the major respiratory diseases in Nigeria. The demographic analysis of tuberculosis patients which gave 38 years as the average age of tuberculosis patients; and more than half were males. The outcome of the findings corroborated with the study of Gurung et al. [19] which indicated that mean age of respondents was 35.23 years; and likewise with Christopher and Ibirinde, [20] findings who stated that the average mean age of male respondents is 36 years while 22 years for female respondents. Moreover, gender result was in agreement with [19], [21] and Oguntoke et al. [22] studies which stated that 60.9%, 68.7% and 56.5% and 59.4% of respondents were males respectively. This implied that tuberculosis disease was more pronounced among the youths and majorly males. This finding is in agreement with Sani et al. [23], but opposing to Nwachukwu et al. [24] report who specified that occurrence of tuberculosis is extremely high among females in Abia state, Nigeria. Furthermore, majority of the respondents were from Yoruba ethnic group and Christians by religion. Based on education, almost half of the respondents had tertiary education, 30% of them had secondary education while 23.3% of them had primary education. The finding of this study corroborated with [19] who reported that 51.2% of the respondents had higher secondary education. However, outcome of this study implies that majority of the respondents were educated.

Outcome of anthropometric measurement showed that one-third (33.3%) of the respondents weighed between 66-72kg, and their height fell within 1.53 – 1.60m and 1.66 – 1.70m respectively. BMI findings revealed that 73.3% of the respondents were within a normal range (18.5 – 24.9 kg/m^2) while 26.7% were underweight (less than 18.5 kg/m^2). The findings of the study did not agree with Feleke et al. [3] who revealed that the incidence of underweight among tuberculosis patients was 57.17%. High percentages of tuberculosis patients were malnourished which did not agree with the outcome of this study which showed that majority of the tuberculosis patients had normal weight while few of them were underweight and at higher risk of developing active disease compared to those with normal weight.

The chi-square revealed that significant relationship (p<0.05) exist between demographic factors (gender 0.048, age 0.038, ethnicity 0.000, religion 0.035, household size 0.004, education, 0.006 and occupation 0.036) and BMI among respondents. This inferred that demographic factors contributed to the body mass index (BMI) of respondents. Conversely, finding indicated that there was a significant relationship (p<0.05) between BMI and anti-tuberculosis drugs. This implied that body fat of the patient might determine the effectiveness of the anti-tuberculosis drugs.

CONCLUSION

Conclusively, the study suggested that occurrence of tuberculosis might be more evident among the males and young adults. Furthermore, most of the tuberculosis patients had normal weight which implied that they did not experience weight loss while few of them were underweight which may be due to the usage of anti-tuberculosis drugs.

ETHICAL APPROVAL

Ethical permission was sought from the Oyo State Research Ethics Review Committee. Informed and written consent was provided by each participant.

COMPETING INTERESTS

Authors declared that no competing interests exist.

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DECLARATION
Ethics Approval and Consent to Participate
Ethical approval was obtained before commencement of this research work and participant gave their consent before proceeding.

CONSENT FOR PUBLICATION
Consent was given for publication in order to contribute to the literature of study.

AVAILABILITY OF DATA AND MATERIALS
Nil

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There were no competing interests

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AUTHORS' CONTRIBUTIONS
All authors contributed in conceptualization, supervision, validation and data analysis.